SUBJECT: The Impact of Deleting Texas from
the MSFN on Skylab Rendezvous -
Case 610

DATE: January 22, 1971

FROM: W. L. Austin

MEMORANDUM FOR FILE

A current Bellcomm study (Reference 1) has shown that deleting the Texas (TEX) station from the MSFN would have a negligible impact on the ability of the network to receive data from the Skylab cluster (interest in deleting the Texas station is prompted by budget problems). This memorandum addresses the impact of deleting the Texas station on the rendezvous portions of the Skylab mission. In particular, it is shown that the rendezvous profile would have to be changed from what is currently planned and the shortest (five orbit) rendezvous capability would be lost.

The current rendezvous profile for SL-2, 3, and 4 restricts the first phasing maneuver (NC1) to occur on the second apogee after insertion, regardless of M number (revolution on which rendezvous occurs). Figure 1 shows the tracking coverage for the nominal SL-2 launch from insertion to just past the NC1 maneuver. With minor variations, this is the tracking available for the NC1 maneuver computations regardless of M number or whether the mission is SL-2, 3, or 4.*

At a recent data priority meeting (Reference 2), it was specified that the CSM and OWS state vector computations will be based on the tracking obtained during the Texas pass shown in Figure 1. These data will then be uplinked to the command module computer via the next Madrid (MAD) pass. Should Texas be eliminated from the MSFN, there will not be sufficient tracking data available for the ground to compute a sufficiently accurate NC1 maneuver. Thus, if the present rendezvous profile is to be retained, the Texas station should be kept in the network, at least for the rendezvous phases of the Skylab missions.

In the event Texas were deleted from the MSFN for fiscal reasons, one alternative would be to return to the previous rendezvous profile. In the previous profile, NC1 occurs on the third and fourth apogees (after CSM insertion) for M=6 and 7 respectively. Even without both Texas and Guaymas, there is sufficient tracking to compute a good NC1 solution for the M=6 and 7 opportunities (Reference 3). The M=5 opportunities

*Since this data was generated, Guaymas (GYM) has been dropped from the MSFN.

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would have to be eliminated as NC1 is scheduled for the second apogee after CSM insertion (same as the present profile). This would reduce the total number of CSM launch opportunities for SL-2, but not the number of days on which SL-2 could be launched (Reference 3). The effect of eliminating all M=5 opportunities on the number of available launch days for SL-3 and SL-4 has not been determined. It is possible that the number of available launch days would be smaller for these missions.

W. L. Austin

1025-WLA-li   W. L. Austin

Attachment

BELLCOMM, INC.

REFERENCES

1. Effect of Manned Space Flight Network Reductions on Skylab Support, J. P. Maloy, Bellcomm Memorandum for File B70 05042, May 22, 1970.

2. Trip Report - Skylab Rendezvous Data Priority Meeting, MSC, C. O. Guffee, Bellcomm Memorandum for File B70 11005, November 3, 1970.

3. Tracking Coverage and Lighting for SL-2 Short Rendezvous, W. L. Austin, Bellcomm Memorandum for File B70 09077, September 30, 1970.

81
INSERTION
(9.95GET)

120
APOGEE
(54.1GET)

81
PERIGEE
(98.2GET)

120
NC1
(142.3GET)

UPLINK PASS

RANGE & RANGE
RATE PASS

D/N

MADUSB

GDSUSB

CNBUSB

TEXUSB

MILUSB

HAWUSB

GYMUSB

GWMUSB

CYIUSB

CROUSB

BDAUSB

SANUSB

ACNUSB

GET -MIN

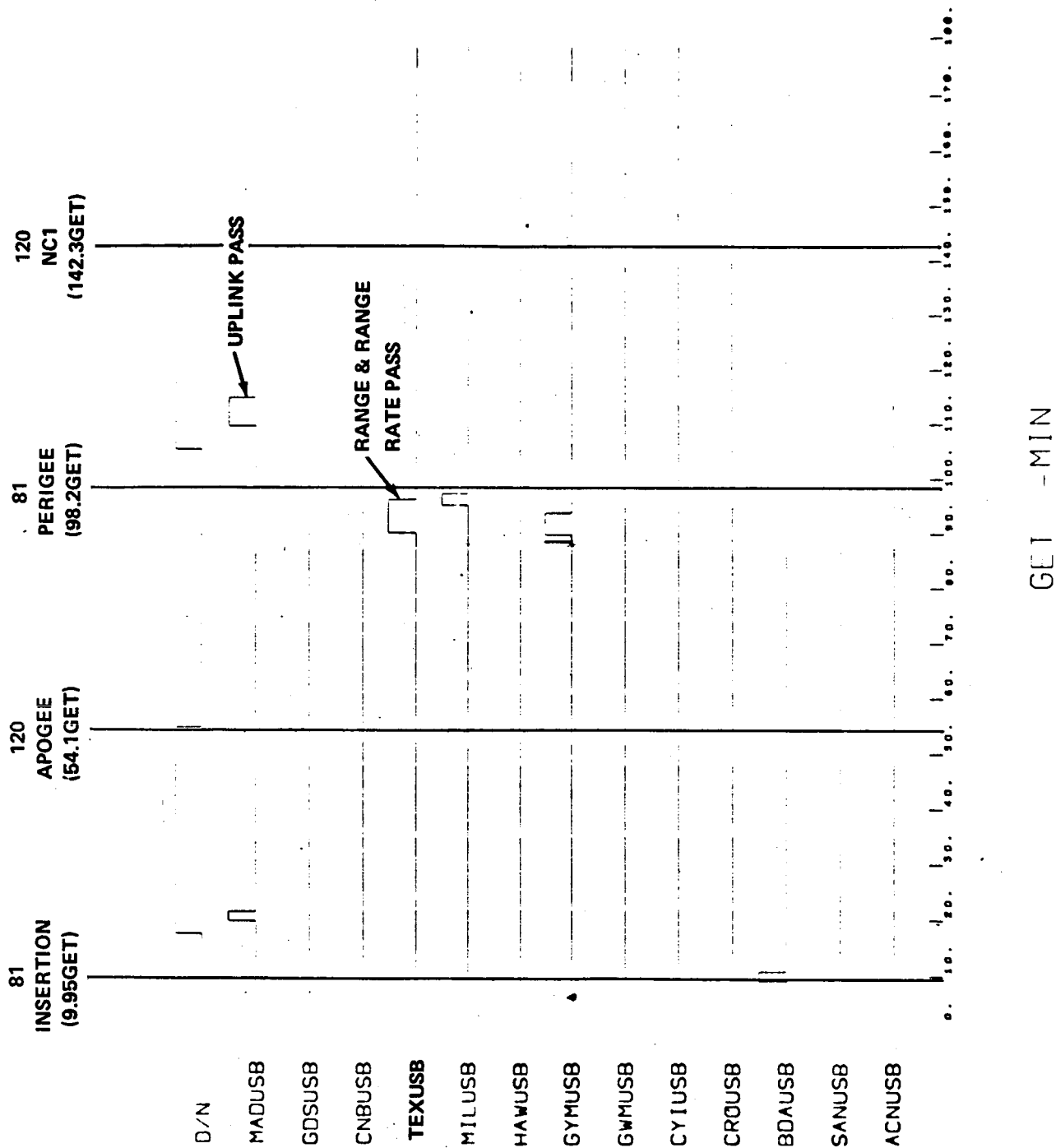0. 10. 20. 30. 40. 50. 60. 70. 80. 90. 100. 110. 120. 130. 140. 150. 160. 170. 180.

FIGURE 1 - SL-2 M=5 DAY 1 MINIMUM PHASE OPPORTUNITY